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in Siam; these are very rarely equal to the Burmese, yet they are fine stones, and, although generally much lower in price, a single stone sold for more than \$1,000; (3) the great profusion and beauty of the opal and the large demand for these stones, which were produced in greater quantity, finer quality and at a somewhat lower cost than ever before from the fields at Fermoy, Queensland, and in the new locality at White Cliff, in New South Wales.

THE article by Dr. Dabney in the issue of this JOURNAL for January 15th, pointing out the advantages of a National Department of Science, was prepared at the suggestion of Hon. Gardiner G. Hubbard, who wrote to Dr. Dabney as follows:

1328 CONNECTICUT AVE.,

WASHINGTON, D. C., January 3, 1897.

DR. CHARLES A. DABNEY, JR., *Washington, D. C.*:

DEAR SIR: My attention has been called at different times during the past year to the great number of scientists employed by the government and the large amount of appropriations. I have also observed that the same subject seemed to be treated often under two and sometimes under three departments, thus leading to needless duplication of labor.

I know that your attention has been somewhat called to this subject. I, therefore, venture to ask you, if your time will permit, to prepare an article for publication, which shall bring out fully all these facts, and also suggest a remedy which would seem to be the placing all this scientific work under one department. I know of no one better fitted than yourself to perform this work and am sure that it will be carefully and correctly done.

Very truly yours,

GARDINER G. HUBBARD.

HON. CHARLES W. DABNEY, JR.,

Assistant Secretary of Agriculture.

UNIVERSITY AND EDUCATIONAL NEWS.

THE New York Court of Appeals has decided the Fayerweather will case by affirming the judgment of the lower court. The residuary estate, now amounting to more than \$3,000,000, will consequently be divided equally among the twenty colleges named in the will. The following institutions will each receive more than \$150,000: Amherst, Bowdoin, Dartmouth, Williams, Yale, Columbia, Hamilton, Lafayette, Lincoln, Maryville, Marietta, Adelbert, Wabash,

Park, Wesleyan, Rochester, Cornell, Virginia, Hampton, and the Union Theological Seminary.

A NUMBER of professors of the University of Berlin have asked permission from the Senate to inaugurate a system of university extension lectures. It appears, however, that there is considerable opposition to the plan in Germany, in part because it is supposed that many university professors might favor the views of social democracy.

ACCORDING to the new *Prussian Budget* professors in the University at Berlin will receive an increase of salary of \$500 Marks, and smaller increases in salary are granted to professors in the other Prussian universities and to teachers in the schools.

MR. HAROLD HEATH has been appointed fellow in biology and Mr. J. M. Mathews fellow in chemistry in the University of Pennsylvania.

DR. E. WIECHERT, docent at the University of Königsberg, has been promoted to a professorship. Dr. Willstätter, of Karlsruhe, has qualified as docent in chemistry in the University at Berlin.

DISCUSSION AND CORRESPONDENCE.

SIMPLIFIED SPELLING.

TO THE EDITOR OF SCIENCE: In a book notice sent to you to-day you will observe two instances of the innovation in spelling proposed by Funk & Wagnalls. Instead of 'grouped' and 'addressed,' I have written 'groupt' and 'addrest.' Unless special instructions are given, your compositor and proof-reader will ignore my attempt at reform and print these words according to the prevalent fashion. Of this I cannot complain, for it is certainly the privilege of a journal to unify its pages in the matter of spelling. Neither am I disposed to criticize SCIENCE for not joining in the spelling-reform movement, for it would be unwise for a journal with its own battles to fight to incur the odium which attaches to rational spelling. The prejudices in favor of irrational spelling are so strong and prevalent that they cannot be opposed without a certain measure of sacrifice on the part of the opponent. Nevertheless, it seems to me that SCIENCE may, without harm to itself, allow such of its contributors as have

joined in the Funk & Wagnalls' movement to reform their particples in signed articles, and I, therefore, submit a request for permission.

G. K. GILBERT.

WASHINGTON, D. C.,

January 18, 1897.

AN EXPLANATION OF THE SO-CALLED PSEUDO-AURORA.

OCCASIONALLY, during the winter season, dwellers of our Northern cities have noticed by night a strange optical phenomenon, which some one has called the 'pseudo-aurora,' and which, so far as I know, has not been heretofore explained.* My attention was first called to it some years ago, in Moorhead, Minn. Over each arc lamp, used in street lighting, appears a strange column of pure white light, seeming to extend vertically to a great height; a peculiar transparent shaft, like the brightest bars of the aurora borealis, yet standing very still, and always vertical over the lamp from whatever point viewed. When each arc lamp in the whole town is thus attended by its vivid shaft the display is magnificent and, seen against the northern sky, might easily suggest the 'pseudo' name. On an evening of special beauty these columns seem to reach almost to the zenith, and other sources of light add their shafts to the display. The evening star gives a shaft below as well as above, and the late rising moon stands right in a broad column of light.

Looking about for causes, and noticing from time to time the conditions under which this meteor appeared, the following facts were observed: The temperature is always below the freezing point, oftenest about zero. The sky is cloudless, air still or barely moving, and more or less full of frost crystals. The display is finer, completer, when most crystals are present, though by no means does the mere presence of crystals in the air furnish the spectacle. The shafts of light are most sharply defined and apparently higher when the air is stillest. With more wind the shafts spread out, diffuse, becoming indistinct, and with a gentle breeze the light seems to be more or less evenly distributed through the entire upper air, like a fine luminous dust suspended there.

* See Loomis's *Meteorology*, p. 224.

Having noticed these conditions, it is apparent that the crystals are the important factor, and reflection of light from their facets is suggested at once. Of course to get a vertical shaft of light by reflection necessitates a constant horizontal position of the crystal faces, and I searched long and arduously for a ballasted crystal, floating like a parachute, but found none. What I did find in each case was a minute hexagonal plate of solid ice, in no case more than one millimeter in diameter, extremely thin, and of glassy smoothness.

I experimented with this idea: Making some hexagonal plates an inch across, of the lightest glazed bond paper, and letting them fall in still air from a height, the whole story is told. Each plate floats gently down, at times making a rapid chute edgewise, but quickly recovering a horizontal position, so that of all the time involved in falling, the larger part is taken up while the plate is in a position approximately horizontal. We have seen the same thing in autumn when the great basswood leaves let go and float slowly down.

Now, filling the air with such plates, each of which is a perfect mirror, we have in the vertical plane, between our eye and the light, innumerable crystals, from the lower surface of which rays of light from the lamp are reflected to our eye, and seen by the eye, as though located in the straight line in which they enter the eye, and at a distance equal to the distance traveled from the lamp. This gives the vertical column, the location of any single point in it being shown by construction, the same as an image in a plane mirror.

The little crystal plate adjusts itself, like a flat stone at the bottom of the torrent, or a cake of ice at the top of the sea, with its broad surface normal to the force acting upon it. So long as this force is gravity only, the position of the crystal is horizontal. But if the wind be blowing this adds a horizontal component, giving with gravity a resultant no longer vertical, to which the plate becomes normal. With the departure of the crystal from the horizontal position the vertical shafts of light disperse.

J. PAUL GOODE.

UNIVERSITY OF CHICAGO.